M.R.O. 1—77,006—8-6-37.

(1) Number of pages 22

(2) Date of repair 1-5-44

(3) Initials of the Referencer

MADRAS RECORD OFFICE.

Government of Madras.

Public works DEPARTMENT.

G.O. No. 483 Press ~~Mis.~~

379-380

Dated 17 2 1871.

Not to be folded or roughly handled

Proceedings of the Madras Government, Public Works Department, 17th February 1871.

Read the following papers :—

No. 379. Read the following letter from R. SMITH, Esq., Executive Engineer on special duty, Madura District, to the Chief Engineer for Irrigation, dated Camp at Veerapandy, 5th January 1871, No. 310-A.

3 Diagrams.
1 Table of rain-fall and discharge of Perryaur.

I HAVE the honour to submit the subjoined Report of the progress made with the Perryaur investigations during December 1870.

2. The 205 and 246-feet saddles have been carefully examined, and all requisite information regarding the level of the rock has been ascertained by sinking trial pits longitudinally and transversely over both sites. The examination of the 248-feet saddle is in progress and will be completed in a few days.

3. As Captain Pennycuick's plan showing the position of the escape tunnel for his arrangement of the head-works has not been received, I went over the ground with Lieutenant Greer, and, in concert with this Officer, decided on the nature and detail of the investigations to be carried out along, and adjacent to, the probable line.

4. By referring to the annexed statement you will observe a commencement was made last month (in accordance with a suggestion made by yourself sometime ago) to ascertain the actual rate of working at the Perryaur. The results are satisfactory and tend to prove that the cost of work, in the hill tracts, need not be excessive :—

Description of soils met with in the trial pits.	Lead.	Cost of excavation per cubic yard.				Remarks.
		First yard or under in depth.	Second yard in depth.	Third yard in depth.	Fourth yard in depth.	
		RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	
Black	From 20 to 30 feet.	0 1 3	0 1 5	......	......	Easy to excavate. No pick required.
Black		0 2 2	......	......	......	Stiff soil had to be picked.
Red		0 2 5	0 2 8	0 3 0	......	Do. do. do.
Decomposed rock...		......	0 2 9	0 3 1	0 3 6	Easily worked.
Decomposed rock difficult to pick...		......	......	......	......	From 3 to 6 Annas per cubic yard.
Stony		......	......	......	......	Do. do. do.

As the weather was fine during December, it would probably be necessary to add 33 per cent. to the above rates to cover the extra cost of working during the *very* rainy months.

5. From the information now available, and from calculations made by Lieutenant Greer and myself, it appears the most economical arrangement for storing the required volume of water in the basin of the Perryaur would be secured by tunnelling through the watershed, and constructing an embankment across the Perryaur at site No. 2 about 220 in height. According to this plan the normal level of the lake would be about 190 feet, and the head of the tunnel about 100 feet above datum. These figures are very nearly accurate, the *exact* levels will be worked out, and the appliances proposed for regulating the discharge from the reservoir will be explained hereafter if you consider it desirable to estimate in

detail for this arrangement also. The rock in the 205-feet saddle is particularly favourable for an escape, if the level of the lake is fixed at or about 190 feet above datum.

6. In calculating the approximate cost of the proposed watershed tunnel, I assumed 20·2 feet per second as the maximum velocity to be allowed through it.

7. Diagrams showing the rain-fall at the Perryaur camp, and the discharge of the Perryaur from the 18th October to the 31st December 1870, inclusive, accompany this report. The table of rain-fall and discharge of the Perryaur for December is also enclosed.

8. The ryots in the Cumbum valley are most anxious to extend their wet cultivation; this should I think be encouraged, as any water supplied to them will reduce the cost of the work lower down.

9. Annexed is an abstract of the surveying and levelling done during the month under review :—

Branch channels set out in miles.	Lineal miles of country surveyed.	Levelling operations. Aggregate length of longitudinal and transverse sections in miles.	Number of permanent bench-marks fixed.	Number of trial pits sunk to the full depth.
24½	77¼	86¾	13	72

PERRYAUR PROJECT.

Table of Rain-fall and Discharge of Perryaur during December 1870.

Date.	Rain-fall at Perryaur.	Hours.	Water level.	Discharge. Cubic feet per second.	Discharge. 1,000 Cubic yards per day.
DECEMBER.	INCHES.		FEET.		
1st … …	0·20	6 A. M.	0·42	426	1,102
		6 P. M.	0·50	451	
2nd … …	0·10	6 A. M.	1·75	981	3,162
		12 NOON.	2·00	1,139	
		6 P. M.	1·50	845	
3rd … …	0·01	6 A. M.	1·75	981	2,922
		6 P. M.	1·50	845	
4th … …	0·01	6 A. M.	0·75	536	1,581
		6 P. M.	0·50	451	
5th … …	0·00	6 A. M.	0·50	451	1,443
		6 P. M.	0·50	451	
6th … …	0·00	6 A. M.	0·42	426	1,363
		6 P. M.	0·42	426	
7th … …	0·02	6 A. M.	0·25	389	1,245
		6 P. M.	0·25	389	
8th … …	0·00	6 A. M.	0·25	389	1,216
		6 P. M.	0·20	372	
9th … …	0·12	6 A. M.	0·12	354	1,133
		6 P. M.	0·12	354	
10th … …	0·15	6 A. M.	0·12	354	1,219
		6 P. M.	0·35	408	
11th … …	0·15	6 A. M.	0·35	408	1,550
		6 P. M.	0·82	561	
12th … …	0·08	6 A. M.	1·30	752	1,987
		6 P. M.	0·62	490	

Proceedings of the Madras Government, Public Works Department,
17th February 1871.

Table of Rainfall and Discharge of Perryaur during December 1870.—(Concluded.)

Date.	Rain-fall at Perryaur.	Hours.	Water level.	Discharge.	
				Cubic feet per second.	1,000 Cubic yards per day.
December.	Inches.		Feet.		
13th	0·15	6 A. M.	0·50	451	1,760
		6 P. M.	1·05	649	
14th	0·02	6 A. M.	1·75	981	2,773
		6 P. M.	1·30	752	
15th	0·00	6 A. M.	1·10	669	2,141
		6 P. M.	1·10	669	
16th	0·02	6 A. M.	0·50	451	1,443
		6 P. M.	0·50	451	
17th	0·00	6 A. M.	0·62	490	1,557
		6 P. M.	0·60	483	
18th	0·01	6 A. M.	0·52	457	1,453
		6 P. M.	0·50	451	
19th	0·01	6 A. M.	0·50	451	1,443
		6 P. M.	0·50	451	
20th	0·00	6 A. M.	0·48	444	1,421
		6 P. M.	0·48	444	
21st	0·00	6 A. M.	0·25	384	1,229
		6 P. M.	0·25	384	
22nd	0·00	6 A. M.	0·10	349	1,117
		6 P. M.	0·10	349	
23rd	0·00	6 A. M.	0·05	339	1,067
		6 P. M.	0·00	328	
24th	0·02	6 A. M.	— 0·04	320	1,024
		6 P. M.	— 0·04	320	
25th	0·00	6 A. M.	— 0·04	320	1,024
		6 P. M.	— 0·04	320	
26th	0·00	6 A. M.	— 0·10	308	986
		6 P. M.	— 0·10	308	
27th	0·00	6 A. M.	— 0·16	296	947
		6 P. M.	— 0·16	296	
28th	0·05	6 A. M.	— 0·20	289	909
		6 P. M.	— 0·25	279	
29th	0·01	6 A. M.	— 0·30	269	845
		6 P. M.	— 0·35	259	
30th	0·01	6 A. M.	+ 0·35	408	1,374
		6 P. M.	+ 0·50	451	
31st	0·00	6 A. M.	+ 0·10	349	1,117
		6 P. M.	+ 0·10	349	
Total ...	1·14				45,853

Depth run off from Catchment Basin of 250 square miles = 2·13 inches.

Mean Discharge ... { 1,479,129 Cubic yards per day.
61,630 ,, ,, per hour.
462 ,, feet per second.

		Cubic yards.
Discharge of Perryaur in December 1869	... ...	100,160,000
Do. do. in do. 1870	... ...	45,853,000
	Difference...	54,307,000

Madura,
10th January 1871.

(Signed) R. SMITH,
Executive Engineer on special duty.

Proceedings of the Madras Government, Public Works Department, 17th February 1871.

No. 14.

NOTE *by the Chief Engineer for Irrigation.*

THE results of the endeavours made to ascertain at what rates work near the Perryaur can be done are, I think, very satisfactory. The daily rates of pay have been reduced 25 per cent., and the working rates much more since 1869, and these reductions will have an important effect upon the amount of the estimate.

Vide G. O., No. 2,466, dated 28th July 1869.

2. It will be seen that Mr. R. Smith proposes, instead of raising the level of the lake to somewhere between 200 and 220, in order to obtain storage above the then intended level of the sill of the cutting through the watershed, to tunnel the watershed on a much lower level, namely, at 100, instead of 155, and to reduce the lake surface proportionately. The alteration will be beneficial if it can be carried out at a moderate expense, and the alternative arrangements should therefore each be estimated for. If the watershed tunnel be in rock of the description found on the surface of these hills, the velocity of 20·2 feet per second through it suggested by Mr. Smith will be moderate, and anything not exceeding 25 feet a second would be admissible. I proposed 45 feet a second as the velocity through the embankment tunnel, but that was a maximum which would seldom be reached, and would never be long maintained.

3. I have Captain Pennycuick's report on the estimates for the head-works with me, and it will be submitted for the orders of Government so soon as I have seen the plans.

(Signed) J. MULLINS, Major, R. E.,
Chief Engineer for Irrigation.

20th January 1871.

No. 380. ORDER THEREON, 17th February 1871, No. 483.

IRRIGATION, No. 17.

THE Government notice with satisfaction the results of the efforts made to reduce the cost of the work at the Perryaur.

2. The alternative arrangements proposed by Mr. R. Smith, for getting storage capacity with a comparatively low lake surface, appear to be worthy of investigation, and if successfully worked out may materially facilitate the execution of the project.

(True Extract.)

Colonel, R. E.,
Secretary to Government.

To the Chief Engineer for Irrigation.
To R. Smith, Esq.
To the Superintending Engineer, 8th Division.

Exd. E. C. Shunker.

No. 310A Special Executive Engineer's Office
Camp Veerapandy 5th January
1871

From,

R. Smith Esqre.
Executive Engineer, On Special duty
Madura District

To,

Major J. Mullins R.E.,
Chief Engineer for Irrigation
Madras

Enclosures 4
3. Diagrams
1. Table of rain-fall and discharge of Perryaur

Sir,

I have the honor to submit the subjoined Report of the progress made, with the Perryaur investigations, during December 1870.

2. The 205 and 246 feet saddles have been carefully examined and all requisite information, regarding the level of the rock, has been ascertained by sinking trial pits, longitudinally and transversely over both sites. The examination of the 248' saddle is in progress and will be completed.

Completed in a few days. —

3. As Captain Pennycuick's plans showing the position of the escape Tunnel, for his arrangement of the Head works, has not been received I went over the ground with Lieutenant Greer, and, in Concert with this Officer, decided on the nature and detail of the investigations to be carried out along, and adjacent to, the probable line. —

4. By referring to the annexed Statement you will observe a Commencement was made last month (in accordance with a suggestion made by yourself sometime ago) to ascertain the actual rate of working at the Perryaur. — The results are satisfactory and tend to prove that the Cost of work, in the Hill tracts, need not be excessive.

excessive. -

Description of soils met with in the Trial pits	Lead	Cost of Excavation per Cubic yard								Remarks
		First yard or under in depth		Second yard in depth		Third yard in depth		Fourth yard in depth		
		Annas	Pies	Annas	Pies	Annas	Pies	Annas	Pies	
Black ____	From 20 to 30 feet	1	3	1	5					Easy to excavate - No pick required
Black ____		2	2							Stiff Soil - had to be picked.
Red ____		2	5	2	8	3	"			__ Do. __ Do.
Decomposed Rock				2	9	3	1	3	6	Easily worked
Decomposed rock difficult to pick.		"	"	"	"	"	"	"	"	From 3 to 6 annas per Cubic yard.
Stony ____										Do. __ Do. __ Do.

As the weather was fine, during December, it would probably be necessary to add 33 per cent, to the above rates, to cover the extra cost of working during the very rainy months.

5. From the information now available, and from calculations made by Lieutenant Greer and myself, it appears the most economical arrangement, for storing the

the required volume of water in the basin of the Perryaur, would be secured by tunnelling through the Watershed and constructing an embankment, across the Perryaur, at site No. 2, about 220 in height. According to this plan the normal level of the lake would be about 190 feet and the head of the Tunnel about 100 feet above datum. These figures are very nearly accurate - the exact levels will be worked out, and the appliances proposed for regulating the discharge, from the Reservoir, will be explained hereafter, if you consider it desirable to estimate, in detail, for this arrangement also. The rock, in the 205' saddle, is particularly favourable for an escape if the level of the lake is fixed at, or about, 190 feet above datum.

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Cost

Cost of the proposed watershed Tunnel I assumed 20·2 feet per second, as the maximum velocity to be allowed through it.

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9. Annexed is an Abstract of the Surveying and Levelling done

during

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Branch Channels set out in Miles	Lineal miles of Country surveyed	Levelling operations: Aggregate length of Longitudinal and Transverse Sections in miles	Number of permanent bench marks fixed	Number of Trial pits sunk to the full depth.
24½	77¼	86¾	13	72

I have the honor to be
Sir,
Your Most Obedient Servant

R. Smith

Executive Engineer
On Special duty
Madura District

No. 310A

From. The Executive Engineer
On Special duty
Madura Distt.

To, The Chief Engineer
for Irrigation
Madras

Dated 5th }
Despd. 10th } January 1871
Received 12th }

PW 45 of 71

Enclosures 4

Submits the Report of the progress made with the Perryaur investigations during December 1870. —

IX

13A

Perryaur Project

Table of rainfall and discharge of Perryaur during December 1870.

Date	Rainfall at Perryaur Inches	Hours	Water level feet.	Discharge Cubic feet per Second	Discharge 1000 Cubic yards per day	Date	Rainfall at Perryaur Inches	Hours	Water level feet.	Discharge Cubic feet per Second	Discharge 1000 Cubic yards per day
December							1.03				28,340
1	0.20	6 a.m. 6 p.m.	0.42 0.50	426 451	1,402	17	0.00	6 a.m 6 p.m	0.62 0.60	490 483	1,557
2	0.10	6 a.m. 12 noon 6 p.m.	1.75 2.00 1.50	981 1,139 845	3,162	18	0.01	6 a.m 6 p.m	0.52 0.50	457 451	1,453
3	0.01	6 a.m. 6 p.m.	1.75 1.50	981 845	2,922	19	0.01	6 a.m 6 p.m	0.50 0.50	451 451	1,443
4	0.01	6 a.m. 6 p.m.	0.75 0.50	536 451	1,581	20	0.00	6 a.m. 6 p.m.	0.48 0.48	444 444	1,421
5	0.00	6 a.m 6 p.m	0.50 0.50	451 451	1,443	21	0.00	6 a.m 6 p.m	0.25 0.25	384 384	1,229
6	0.00	6 a.m 6 p.m.	0.42 0.42	426 426	1,363	22	0.00	6 a.m 6 p.m	0.10 0.10	349 349	1,117
7	0.02	6 a.m. 6 p.m.	0.25 0.25	389 389	1,245	23	0.00	6 a.m 6 p.m.	0.05 0.00	339 328	1,067
8	0.00	6 a.m 6 p.m	0.25 0.20	389 372	1,216	24	0.02	6 a.m 6 p.m	-0.04 -0.04	320 320	1,024
9	0.12	6 a.m 6 p.m	0.12 0.12	354 354	1,133	25	0.00	6 a.m 6 p.m	-0.04 -0.04	320 320	1,024
10	0.15	6 a.m. 6 p.m	0.12 0.35	354 408	1,219	26	0.00	6 a.m 6 p.m	-0.10 -0.10	308 308	986
11	0.15	6 a.m 6 p.m	0.35 0.82	408 561	1,550	27	0.00	6 a.m 6 p.m	-0.16 -0.16	296 296	947
12	0.08	6 a.m. 6 p.m.	1.30 0.62	752 490	1,987	28	0.05	6 a.m 6 p.m	-0.20 -0.25	289 279	909
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Mean Discharge { 1,479,129 Cubic yards per day
61,630 " " per hour
462 " feet per second

		Cubic yards
Discharge of Perryaur in December 1869		100,160,000
Discharge of Do in Do 1870		45,853,000
	Difference	54,307,000

Special Exe: Engrs office
Madura 10th January 1871

Compd [illegible]

A Smith
Executive Engineer
On Special duty Madura Distt.

Enclosure No. 4 in a Letter from the Executive Engineer On special duty, Madura District, dated 5th January 1871. –

Recd. No. 310 A

To,
The Chief Engineer
for Irrigation
Madras.

P.W. 458/71

Perryaur Project

Table of Rain-fall and discharge of Perryaur during December 1870.

No 14.

15A

Note by the Chief Engineer for Irrigation

Enclo: 5

The results of the endeavours made to ascertain at what rates work near the Perry[ar] can be done are, I think, very satisfactory. The daily rates of pay have been reduced 25 per cent, and the working rates much more since 1869, and these reductions will have an important effect upon the amount of the estimate

vide G.O. No 2466 dated 28th July 1869

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20th January 1871. (Signed) John Mullins Major R.E.
Chf Engr for Irrigation

To
The Secretary to Govt P. W. D.

PW 1871 Dept

Pro: of Govt for February

(11) No. 458.

From

The Chf Engr. for Irrigation

To the Secretary to Govt.

P.W. Dept.

Dated 20th
Despd.
Recd. 31st January 1871.

No. 14. 2-E. Recd

Encls. 5

3 Plans

Note on the progress report of the Perryaur investigation for Decr/70.

No. 483 - 17th Feby/71

No. 379

No. 6. Feby/71 R. 6th

Public Works Department

No. 483

Proceedings of the Madras Government

Read the following

From

The Chief Engineer for Irrigation } (H.E. No. 14. D. 20th January 1871.)

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wor[k]

(6)

worked out may ma-
terially facilitate the
execution of the project.

Wb

19/3

To
3 The Chief Engineer for Irrigation
3 R: Smith Esqre

Despo 18/2/71

22A Cp 458

Govt of (1871) Madras.

PUBLIC WORKS.

To The Chief Engr. for Irrigation

Dated

Recd. No. 5

G. O., 17 Feby 1871, No. 483.

Nos. 379 & 380

Perriyaur Project - Papers

Orders on the note by the Chief Engr. for Irrign. on the Progress Report of the investigations of the Perriyaur Project for Dec 70.